

# Older Tank Systems

Tank systems installed prior to September 16, 1991, have a variety of requirements to prevent leaks and spills. Prior to that date, tanks and piping did not have to be double-walled.

About one-third of Maine's tanks are of this older category. In this chapter, you will learn about options, actions and records for your UST system.



## This section applies to you if:

- ☐ Your tank and piping were installed before September 16, 1991.
- ☐ Your tank was installed prior to September 16, 1991 but your piping was upgraded later.
- ☐ You installed double-wall tank and/or piping before it was mandatory.



## Detecting Leaks

One of the most important things you can do is to periodically ensure that your UST tank and piping are not leaking. In this section we will cover options, actions, and records.



**Report all known or suspected leaks immediately.**

### Terms to know in this section

- ☐ Automatic line leak detector or ALLD
- ☐ Automatic tank gauge or ATG
- ☐ Interstitial monitoring
- ☐ Inventory reconciliation
- ☐ Pressurized piping
- ☐ Safe suction piping
- ☐ Statistical inventory analysis or SIA
- ☐ Suction piping
- ☐ Sump
- ☐ Sump sensor

**Not every page in this section will apply to you.** Make sure you know your tank system so you can learn about your particular requirements.



Your choices of leak detection methods are different for tanks and piping.

## Leak Detection for Tanks

It depends on whether you have a single or a double-wall tank.

**Single wall tank:** Check one of the following:

- ☐ Perform inventory reconciliation plus do annual statistical inventory analysis (SIA), or
- ☐ Have an automatic tank gauge or ATG set to detect very small leaks (some restrictions apply), or
- ☐ Perform inventory reconciliation plus have an automatic tank gauge set to detect small leaks once a month (some restrictions apply).

**Double-wall tank:** Check one of the following:

- ☐ Perform continuous electronic monitoring; or
- ☐ Do one selection listed above for single-wall tanks.  
(NOTE: This applies if you have a double-wall tank but the tank was not designed to have electronic monitoring.)

## What is Inventory Reconciliation?

Inventory Reconciliation is the old-fashioned way of doing leak detection. You stick the tank and record the fuel level, add up all fuel deliveries, then convert that information at the end of each month into a leak rate using a simple formula provided by the State.

Think of this method as a check book. Daily inventory is the amount of each check you write. Deliveries are like each deposit you make. And Monthly Reconciliation is balancing your account to see how much money you have. The rules allow your balance to be off by plus or minus 1% of your monthly throughput.

**If you do not reconcile each month, you cannot detect a leak.**



Cracked and worn sticks can give you bad readings.



Take measurements carefully.

## What is Statistical Inventory Analysis?

If Monthly Reconciliation is balancing your check book, Statistical Inventory Analysis (SIA) is double checking your results with an accountant.

When doing SIA, an operator takes a month's worth of daily inventory and reconciliation measurements and sends it to an approved company who analyzes the numbers. What the operator gets back is a calculated leak rate of either pass, fail, or inconclusive.

**This method must be accurate to one-tenth of a gallon (0.1) an hour to be legal.**

SIA test results must be sent to the Maine DEP for review and approval each year. This is separate from the annual inspection.



## What is an Automatic Tank Gauge?

An automatic tank gauge or ATG is a device that monitors the level of fuel in your tank over time and converts that information into a measurable leak rate. So long as you can detect no more than a leak rate of one-tenth of a gallon per hour, you are legal. A leak smaller than that amount is considered too small to accurately measure.

Your ATG must be set to detect very small leaks of 0.1 gallons per hour.

That's a leak the size of a shot glass every hour.

**A**utomatic  
**T**ank  
**G**auge



Veeder-Root model

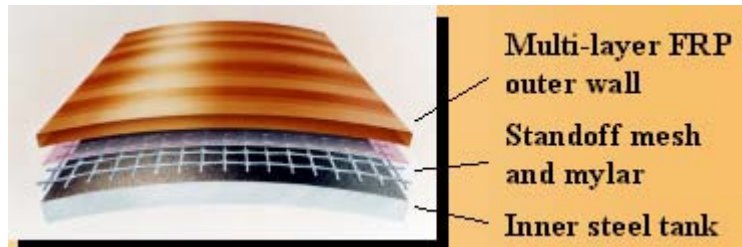
**You must notify DEP in writing if you use this method.**

You can use your ATG for inventory control measurements or as a stand-alone leak detection method, or both. Certain restrictions apply.

## What is Interstitial Tank Monitoring?

That means you have a tank with an inner and outer wall plus some way of checking for leaks between the two walls. To be more specific, you must continuously check the interstitial space, the gap between the inner and outer wall of the tank, and ensure there is no petroleum or water in that space.

**Water or oil in between the tank walls can spell trouble!**



## What does a double-wall tank monitor look like?

Your tank system should have an electronic sensor in the interstitial space that is connected to a stand-alone or combination console. The sensor should be set to check the interstitial space on a continuous basis.



Stand-alone console

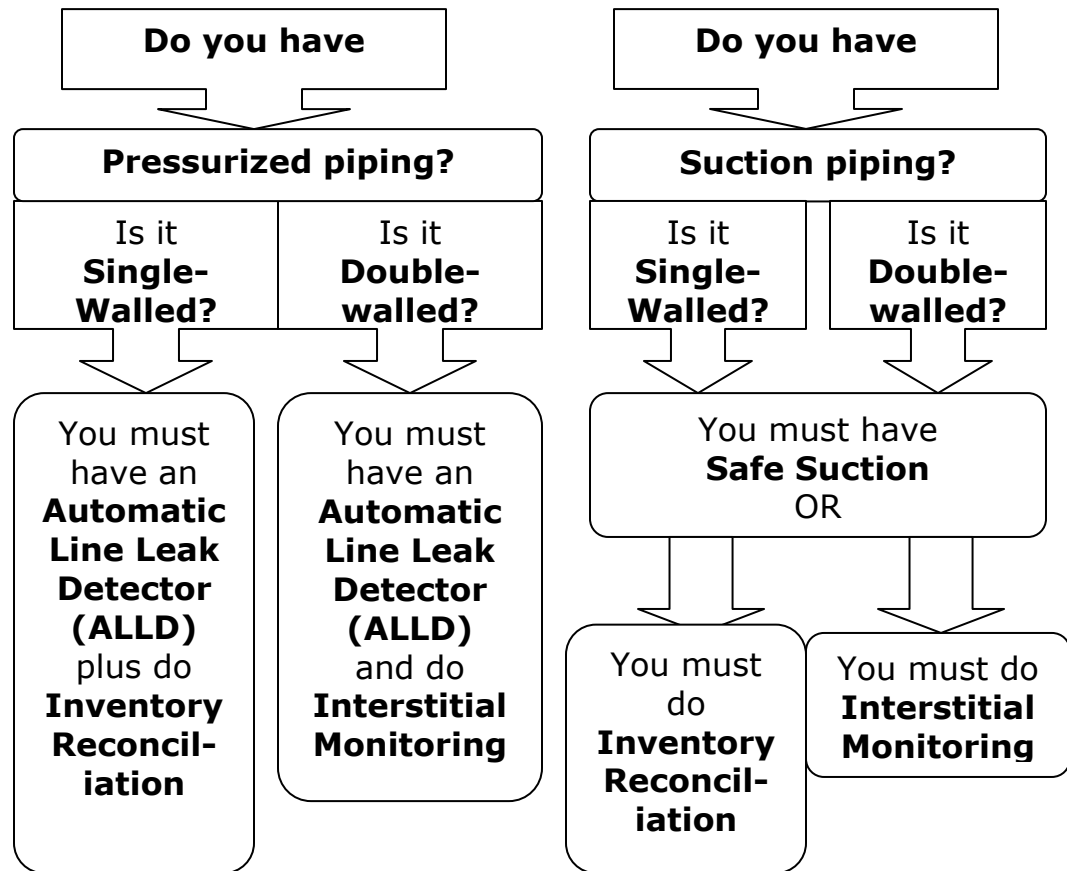


Combination console

Now that you have reviewed the options for tanks, the next section will help you with your piping.



**Leak Detection for Piping** Your leak detection options depend on whether you have pressurized or suction piping and whether you have single or double-wall piping.



How do I know if I have single or double-wall piping?

- ☐ Check installation records
- ☐ Contact installer
- ☐ Contact Maine DEP



Single-walled



Double-walled



How do you know if you have pressurized or suction piping?

**Pressurized**

- ☐ Fuel is pushed out of tank.
- ☐ Pump is inside tank.

**Suction**

- ☐ Fuel is pulled out of tank.
- ☐ Pump is under dispenser.



What does a double-wall piping monitoring look like?



You can check the interstitial space in the sump electronically with a sensor or manually by visual inspection.

You are allowed to do this manually on older systems, but it is not as common because it is difficult to do and time consuming.

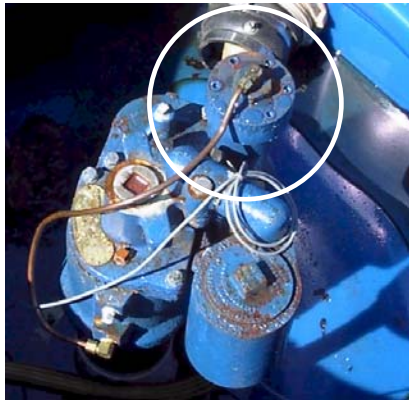


There should be a sensor in the lowest point of the piping system, typically located in the sump where the pump is housed. The sensor should be wired into the same console used to show leak detection for the tank as well.

## What is an automatic line leak detector?



An automatic line leak detector is a mechanical or electronic device that constantly monitors piping pressure. When a leak occurs, the pressure drops and the leak detector shuts off fuel flow. It is usually located on the pump head, which should be accessible when you open up the sump manway. They come in blue, black, red, and tan.



## Automatic Line Leak Detector

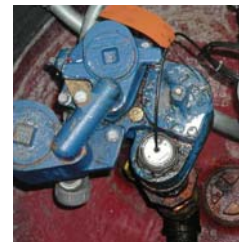
There are many different makes and models of leak detectors. Can you find yours?



Red Jacket



Vaporless



Veeder-Root



FE Petro



Incon

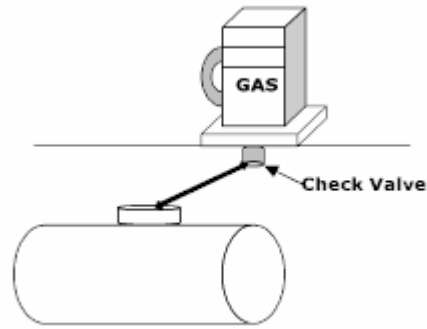


FE Petro

## What is safe suction?

Safe suction means your suction piping meets three conditions:

1. **The piping slopes back** to the tank, meaning the dispenser is always higher than the tank.
2. **The piping operates at less than atmospheric pressure**, meaning it is not pressurized.
3. **There is only one check valve** at the top of the pipe run, underneath the dispenser, meaning that a break in the piping will cause the fuel to drain directly into the tank with no release to the environment.



If you meet all three conditions, you do not need to test the piping: only watch for a malfunctioning pump.

If the pump is sucking in air and not providing fuel, you may have a leak in the piping. Notify DEP immediately.



Now that you know what type of leak detection equipment you have, what do you do next? Check for leaks! State and Federal law says there are certain things you must do to keep an ever-vigilant eye for potential problems.



## Checklist: Doing Leak Detection Right

- ☐ Check for leaks using the method you have identified for your tank and piping.
- ☐ Understand exactly what you are measuring and what the results mean.
- ☐ Make sure you keep records of your results.
- ☐ Treat a suspected release as a serious problem.
- ☐ Notify DEP immediately if you know of or suspect a problem.

## For Inventory Reconciliation

In order to use this method correctly, you must do three things:

### 1. Daily Inventory

- ☐ You must stick the tank every day of operation and record fuel levels.
- ☐ Your stick must not be cracked or worn.
- ☐ Your dispenser must have properly calibrated totalizer.
- ☐ The tank must have a drop tube below the fill piping.
- ☐ You must keep a record of all fuel deliveries.

### 2. Monthly Reconciliation

- ☐ You must measure water levels.
- ☐ At the end of each month you must compare monthly overages or shortfalls to the total throughput.
- ☐ If you are over or under by 1% of your total throughput, you have a possible leak.

### 3. Annual Statistical Inventory Analysis

- ☐ You must have an independent firm double check the math (see page 38).
- ☐ You must report the results to DEP.



#### **Every 30 days you must**

1. Add up the month's overages or shortfalls.
2. Compare that to the throughput.
3. Determine whether your final number is acceptable.
4. Keep record of your results.

You can do daily inventory control two ways:

- ☐ Electronically with an automatic tank gauge.
- ☐ Manually with a stick.



**If you cannot get a valid or passing test you may have a leaking tank. Report all known or suspected leaks immediately.**

# MONTHLY INVENTORY RECONCILIATION REPORT

Month/ Year \_\_\_\_\_ / \_\_\_\_\_

Facility & Location : \_\_\_\_\_

Registration Number: \_\_\_\_\_

Tank Size and Fuel Type: \_\_\_\_\_

Certified By: \_\_\_\_\_

Date	Opening Inventory (Book Inventory of Previous Day)	Gallons Pumped	Gallons Delivered	Book Inventory Balance	Closing Stick Inventory	Daily Over or <Short>	Inches Water	Initials
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
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21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
<b>MATH CHECK</b>		-	+	=				

1. Leak Check: Sum of Gallons pumped ( \_\_\_\_\_ ) x .01 = \_\_\_\_\_

2. Is "Total Daily Over or Short" greater than "Final Leak Check"? **Yes** **No**

3. If the answer is **Yes**, you have evidence of a possible leak. You should notify Maine DEP as soon as possible at (207) 287-7655

**INSTRUCTIONS AND SAMPLE SHEET ON NEXT PAGE**

# **SAMPLE INVENTORY RECORD**

This is a sample inventory record which should help you to understand how this data is recorded. The letters are keyed to the marked items on the record.

**A. Opening Inventory** means recording the actual gallons of product the first day of each month as described below in (B). After the first day you must record the previous day's *Book Inventory Balance* in this column.

**B. Closing Stick Inventory** must be taken at the end of each day when you have stopped pumping product. You must use a stick which is marked off in 1/8" increments. Place 1-2" of water finding paste at the bottom of the stick and insert it into the fill pipe it touches the bottom. Withdraw the stick quickly and read and record the height of the product on the stick to the nearest 1/8". Use a tank chart to convert the stick measurement to the corresponding gallons present. The gallons represented by fractions of an inch will have to be calculated from the gallon values for whole inches.

**C. Gallons Pumped** should be read and recorded each day (at the time the tank is stuck) from the meter readings on the tank's pump dispenser.

**D. Gallons Delivered** should be recorded in this column each day product is delivered to the tank.

**E. Book Inventory Balance** is equal to the **Opening Inventory** (A) minus the **Gallons Pumped** (C) plus the **Gallons Delivered** (D).

**F. Daily Over or <Short>** (F) is equal to the **Closing Stick Inventory** (B) minus the **Book Inventory Balance** (E).

**G. Inches Water** what you read off the stick while measuring product in the tank must be recorded each day, even if there is none.

**H.** Enter the **Opening Inventory** figure for the first day of the month in this box.

**I.** Enter the sum of the **Gallons Pumped** for the entire month in this box and on the line below.

**J.** Enter the sum of the **Gallons Delivered** for the entire month in this box.

**K.** Take **Opening Inventory** (H), subtract **Total Gallons Pumped** (I) then add **Total Gallons Delivered** (J) to get K..

**L.** Enter the final **Closing Stick Inventory** for the month here (carry the number above it).

**M.** Take the **Closing Stick Inventory** (L) and subtract the number in (K).

**N.** Multiply the **Sum of Gallons Pumped** by .01 (or drop the last two digits) and enter the final number here.

**O.** Compare M and N. If **Daily Over or <Short>** (M) is greater than **Leak Check Result** (N), you have evidence of a possible leak and must notify DEP immediately. If N is greater than M, then the tank passes leak detection for that month.

MONTHLY FUEL REPORT/ DAILY INVENTORY								
Month/Year <u>7/02</u>								
Facility & Location: <u>Tom's Farm, Fort Kent</u>					Registration Number: <u>19985</u>			
Tank Size and Fuel Type: <u>4,000 gallon Regular Unleaded</u>					Certified By: <u>Tom Smith</u>			
Date	A. Opening Inventory (Book Inventory of Previous Day)	C. Gallons Pumped	D. Gallons Delivered	E. Book Inventory Balance	B. Closing Stick Inventory	F. Daily Over or <Short>	G. Inches Water	Initials
7-1	2320	449		1871	1863	<8>		TS
7-2	1871	296		1575	1551	<24>		TS
7-3	1575	568		1007	972	<35>	0	TS
7-4	1007	551		456	408	<48>	0	TS
7-5	456	578	3502	3380	3360	<20>	0	TS
7-6	3380	574		2806	2788	<18>	0	TS
7-7	2806	743		2063	2025	<38>	0	TS
7-8	2063	592		1471	1421	<50>	0	TS
7-9	1471	377		1094	1051	<43>	0	TS
7-10	1094	576	3000	3513	3473	<45>	0	TS
7-11	3518	440		3078	3069	<9>	0	TS
7-12	3078	538		2540	2522	<18>	0	TS
7-13	2540	657		1883	1844	<39>	0	TS
7-14	1883	613	2360	3630	3597	<33>	0	TS
7-15	3630	519		3111	3111	<0>	0	TS
7-16	3111	447		2664	2634	<30>	0	TS
7-17	2664	516		2148	2088	<60>	0	TS
7-18	2148	464		1684	1608	<76>	0	TS
7-19	1684	567		1117	1043	<74>	0	TS
7-20	1117	656	3004	3465	3428	<37>	0	TS
7-21	3465	712		2753	2703	<50>	0	TS
7-22	2753	554		2199	2128	<71>	0	TS
7-23	2199	372		1827	1755	<72>	0	TS
7-24	1827	623		1204	1125	<79>	0	TS
7-25	1204	453		751	652	<99>	1/4"	TS
7-26	751	651	3300	3400	3328	<72>	1/4"	TS
7-27	3400	497		2903	2848	<55>	1/4"	TS
7-28	2903	496		2407	2320	<87>	1/4"	TS
7-29	2407	580		1827	1729	<98>	1/4"	TS
7-30	1827	584		1243	1126	<117>	1/4"	TS
7-31	1243	590		653	584	<69>	114"	TS
Math Check	H. 2320	I. -16833	J. +15166	K. = 653	L. 584	M. <69>		
<b>N. Leak Check:</b> Sum of Gallons Pumped ( <u>16,833</u> ) X .01= <u>.168</u> <b>O. Is M greater than N?</b> YES <b>NO</b> If <b>Daily Over or &lt;Short&gt;</b> (M) is greater than <b>Leak Check Result</b> (N), you have evidence of a possible leak and must notify DEP at (207) 287-2651.								

## For Statistical Inventory Analysis

Statistical inventory analysis means double-checking the math on your monthly inventory readings to confirm whether or not your tank is leaking at a very small rate.

In order to use this method, you must ensure the following things:

- ☐ You are doing daily inventory and monthly reconciliation properly.
- ☐ You are using an approved vendor.
- ☐ If you get an "inconclusive" or "invalid" test, you must re-do the test.
- ☐ If you get a "fail", you must call DEP immediately, and re-do the test or do a precision test.

### **Once a year you must**

1. Send a month's worth of stick readings to a SIA vendor.
2. SIA Vendor must indicate results.
3. Send proof of passing to Maine DEP.

Doing SIA is separate from the annual inspection. It is your job to make sure both happen.



**SIA results due to DEP annually**

## Who is approved to do SIA in Maine?

### **Petroleum Inventory Management**

260 Maine Ave. Suite 300  
Farmingdale, ME 04344  
207-582-1373  
800-281-1109

### **Simmons Sirvey Corporation**

106 East Main Street  
Richardson, TX 75081  
972-497-6002  
800-848-8378  
www.simmons-corp.com

### **Gilbarco Veeder-Root**

12265 West Bayaud Ave.,  
Lakewood, CO 80228  
800-253-8054  
www.veeder.com

### **SIR International Inc.**

P O Box 700  
Locust Grove, OK 74352  
800-793-1919



**A failed SIA test means you may have a leaking tank. Report all known or suspected leaks immediately.**

## For Automatic Tank Gauging

In order to use an automatic tank gauge as the sole method for leak detection, you must ensure the following things:

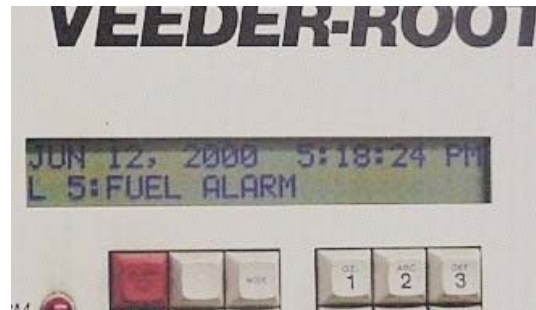
- ☐ Console is set to detect a very small leak rate of 0.1 gallons per hour (GPH).
- ☐ The ATG is third-party approved to detect a leak of 0.1 GPH (not all devices are).
- ☐ The test must be run at least every 30 days.
- ☐ The tank must be at least 60% full or the test is not valid.
- ☐ You cannot pump fuel or receive a delivery during the test.
- ☐ The ATG must be set to test water levels too.
- ☐ ATGs that are designed for a "continuous test" are not acceptable because they are not accurate enough.
- ☐ The ATG must be approved by a third party vendor to meet its performance claims.

### **Every 30 days you must**

1. Make sure the device is functioning.
2. Run a test once a month.
3. Check that you get a Pass; otherwise call DEP.
4. Keep a record of each test.



Keep the paper full



Watch for warnings

An inspector must check your ATG each year to make sure it is functioning properly.



**A failed tank test can mean you have a leak. Report all known or suspected leaks immediately.**

## For Interstitial Monitoring

You must ensure that the tank and piping are tight and free of liquid oil or water. The presence of oil means the inner wall of the tank may have a leak. The presence of water may mean the outer wall of the tank has a hole and ground water is getting in. Under either scenario, it means you have a problem.

In a nutshell, having a double-walled system is only as good as your diligence to monitor what is going on between the two walls.

For Tanks Checking the double-wall tank means checking the console that is wired to the sensor in the interstitial space. Your console will either be an automatic tank gauge or a standalone console. Once a year during inspection the console and the sensor must be tested to make sure they are functioning properly.



**Always look  
and listen  
for alarms.  
Report all  
known or  
suspected  
leaks  
immediately.**

**Interstitial monitoring  
means always watching  
for leaks.**

**Check the system every  
30 days for proper  
operation by testing the  
alarm button.**

For Piping Checking the double-wall piping means checking the console that is wired to the sensor in the lowest point of the piping system, often called the sump. Your console will either be an automatic tank gauge or a standalone console. Once a year the console and sensor must be tested to ensure they are working properly.



**Always look  
and listen  
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Report all  
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suspected  
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immediately.**

**Interstitial monitoring  
means always watching  
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**Check the system every  
30 days for proper  
operation by testing the  
alarm button.**



Ken has pressurized piping with a sensor in each piping sump. One day a sump sensor alarmed. Ken found the sensor immersed in water in the sump and discovered that the boot where the secondary piping enters the sump was torn, letting ground water in the sump. There was no sheen on the sump water and Ken was able to pump it out. He notified DEP on the day the alarm went off.



### **Problems with double-wall piping**

If anything goes wrong with interstitial monitoring, chances are it will occur in the piping sump. Here are common problems found in sumps and what you can do about it. Have your UST service provider fix these.

- ☐ Water or oil accumulates in bottom.
- ☐ Sump sensor raised too high to detect release.
- ☐ Piping boots loose, damaged or cracked.
- ☐ Holes in side of sump wall or sump bottom.

### **For automatic line leak detectors**

You must ensure that you have an automatic line leak detector placed on each length of pressurized pipe. You must also:

- ☐ Have the detector tested annually.
- ☐ Respond to shut-down or slow-flow events.
- ☐ Notify DEP of known or suspected releases.



### **What happens when a leak detector detects a leak?**

- ☐ **For mechanical models:** the leak detector will constrict the line, causing a "slow flow" situation at the dispenser. If a customer complains that he/she is getting only a trickle out of the nozzle, chances are the line leak detector has tripped, indicating a potentially serious problem.
- ☐ **For electronic models:** the leak detector is wired to the pump controller, so if the leak detector finds a leak, it shuts down the pump. Now the customer gets no fuel from the nozzle. This could indicate a serious problem.

## Testing a line leak detector

Testing a line leak detector means removing fuel from the piping at a known rate and seeing if the leak detector catches it.



The certified tank installer or inspector removes fuel beneath the dispenser from the crash valve opening. Fuel is removed at a rate of 3 gallon per hour, the minimum detection limit of the line leak detector. If the leak detector detects the fuel "loss", it passes the test. If it fails to detect the "loss", it fails its ability to detect a leak and should be replaced.



**Always watch for fueling interruptions due to unexplained pump shut-down or slow-flow from the nozzle. Report all known or suspected leaks immediately.**



### **Problems with Automatic Line Leak Detectors**

- ☐ If they are not working properly, they can mask a really big leak.
- ☐ They can wear out after a while.
- ☐ If someone removes the detector to by-pass a reoccurring slow-flow or shut-down problem.



## Leak Detection Summary for Older Tanks

Leak detection record keeping depends on the method or equipment that you use.

What you need to do is fairly straightforward but depends somewhat on the type of piping you have. Here is a summary.

Leak Detection	Option	Action	Records*	Bottom Line
<b>Single or Double-wall Tank</b>	Daily Inventory, monthly reconciliation, annual SIA	Stick tank every day, reconcile monthly	Hardcopy record for Daily inventory, monthly reconciliation, and SIA	Book inventory should match stick inventory
<b>Single or Double-wall Tank</b>	Automatic tank gauge	Check for very small leaks once a month	Hardcopy printout record	Monthly 0.1 gph leak test
<b>Double-Wall Tank</b>	Interstitial monitoring	Check system every 30 days for proper operation	Hardcopy record	Continuously check for leaks
<b>Pressurized Piping</b>	Interstitial monitoring	Check system every 30 days for proper operation	Hardcopy record	Continuously check for leaks
<b>Pressurized Piping</b>	Automatic line leak detector	Have function tested annually	Test record of passing	Pressurized piping needs extra vigilance
<b>Safe Suction Piping</b>	Watch for improperly operating pump as evidence of a possible leak.			
<b>"Unsafe" Suction Piping</b>	Daily Inventory, monthly reconciliation, annual SIA	Stick tank every day, reconcile monthly	Hardcopy record for Daily inventory, monthly reconciliation, and SIA	Book inventory should match stick inventory

**\* KEEP ALL LEAK DETECTION RECORDS FOR LAST 3 YEARS READILY AVAILABLE.**

